In the Claims

Claims 1-62 (canceled)

63. (New) An implantable construct for implantation into a cartilage lesion prepared by a process of converting and rejuvenating non-active, non-dividing, mature chondrocytes that are not able to produce an extracellular matrix into rejuvenated chondrocytes that produce a newly formed extracellular matrix, said process comprising steps:

a) isolating chondrocytes from a donor's joint cartilage;

b) expanding said isolated chondrocytes of step a) by culturing said chondrocytes in a culture medium;

c) suspending the cultured chondrocytes of step b) in a collagen solution, a collagen gel or a thermo-reversible hydrogel;

d) introducing said suspension of step c) into a collagenous support matrix thereby seeding said matrix with suspended chondrocytes; and

e) subjecting said chondrocytes seeded within said support matrix of step d) to an activation step comprising applying to said support matrix seeded with chondrocytes a cyclic hydrostatic pressure from about 0.01 MPa to about 10 MPa above atmospheric pressure, said pressure being applied at a frequency of from about 0.01 to about 1 Hz, for from about one hour to about eight hours, followed by a resting period wherein said support matrix is subjected to an atmospheric pressure for from about eight hours to

about twenty three hours, said activation step performed under perfusion with a perfusion medium at a flow rate from about 1 to about 500 µL per minute, said activation step repeated for from about 1 day to about 60 days, thereby activating said inactive chondrocytes seeded within said support matrix to synthesize a new extracellular support matrix and forming said implantable construct;

wherein said chondrocytes of step a) are mature, inactive and non-dividing chondrocytes unable, without employing the activation step e) to synthesize the extracellular matrix, wherein said chondrocytes are isolated from a donor's joint cartilage and wherein said chondrocytes are isolated by enzymatic digestion of said joint cartilage;

wherein said collagenous support matrix of step d) is a collagenous sponge, collagenous scaffold, collagenous honeycomb or collagenous honeycomb-like lattice, each containing a plurality of pores having a size ranging from about 50 µm to about 500 µm;

wherein said formed implantable construct comprises more than 5% of activated chondrocytes and a ratio of the newly synthesized extracellular matrix to activated chondrocytes is lower than 95:5.

64. (New) The construct of claim 63 wherein said collagenous support matrix is prepared from a material selected from the group consisting of a Type I collagen; Type II collagen; Type IV

collagen; a collagen containing glycosaminoglycan, agarose or hyaluronin; a collagen containing proteoglycan, glycoprotein, gelatin, fibronectin, laminin, bioactive peptide, growth factor or cytokine; a collagen containing a synthetic polymeric fiber made of a polylactic acid, polyglycolic acid, polyamino acid or polycaprolactone; and a combination thereof.

65. (New) The construct of claim 64 wherein said support matrix is prepared from the Type I collagen.

66. (New) The construct of claim 63 wherein said chondrocytes are suspended in the collagen solution or in the collagen gel.

67. (New) The construct of claim 63 wherein said chondrocytes are suspended in the thermo-reversible hydrogel that may be thermally converted to a solid gel.

68. (New) The construct of claim 63 wherein said cyclic hydrostatic pressure applied to said support matrix of step d)is from about 0.05 MPa to about 3 MPa applied at a frequency from about 0.1 to about 1 Hz.

69. (New) The construct of claim 68 wherein said cyclic hydrostatic pressure is about 0.5 MPa applied at a frequency of

about 0.5 Hz.

70. (New) The construct of claim 63 wherein said activation of the chondrocytes of step e) is additionally performed under a reduced oxygen concentration of less than 20%.

71. (New) The construct of claim 70 wherein additionally said activation of chondrocytes is performed at about 5% concentration of carbon dioxide.

72. (New) The construct of claim 63 wherein said support matrix has pores from about 100 µm to about 300 µm.

73. (New) The construct of claim 72 wherein said support matrix has pores from about 200 µm.

74. (New) The construct of claim 63 wherein said perfusion rate is from about 5 µl/min to about 50 µl/min.

75. (New) The construct of claim 74 wherein said perfusion rate is about 5 µl/min.

76. (New) The construct of claim 63 wherein said isolated chondrocytes of step a) are autologous.

77. (New) The construct of claim 63 wherein said support matrix is the collagenous sponge or collagenous honeycomb seeded with isolated and expanded chondrocytes suspended in the Type I collagen solution.

78. (New) The construct of claim 63 implanted into a cartilage lesion.